# TRANSLATION OF CLAIMS AMENDED IN THE INTERNATIONAL PRELIMINARY EXAMINATION REPORT

## Claims

1. A capacitive sensor for detecting the filling level of a medium (35) in a container (30) with a non-metallic wall (31), said sensor being connected to the earth or ground (50), comprising an amplifier (1) with an input (3) and an output (4), said amplifier (1) being provided with a feedback, and said sensor also comprising a circuit that supplies a switching signal when the amplifier (1) is not oscillating,
characterized by a first electrode (11) that is connected to the input (3) of the amplifier (1) and that is loaded with a first capacitance (21) vis-à-vis the ground (50), so that the input (3) of the amplifier (1) is capacitively loaded, whereby the electrode (11) is arranged in such a way that the electric field (41) generated between the electrode (11) and the ground (50) by the signal (2) that is fed back from the output (4) of the amplifier (1) to the input (3), runs essentially through the container (30) and through the medium (35) to the ground (50) so that the magnitude of the first capacitance, on the one hand, increases as the filling level of the medium (35) in the container (30) rises and, on the other hand, is influenced by the capacitive properties of the container (30),
by a second electrode (12) that is connected to the output (4) of the amplifier (1) and

by a third electrode (13) that is connected to the input (3) of the amplifier (1),

whereby the second electrode (12) and the third electrode (13) are located at a distance from each other on the container wall (31) of the container (30) and are positioned in such a way that, due to an electric field (42) that is generated, a second capacitance (22) exists between them whose magnitude is largely influenced by the capacitive properties of the container (30) or of the container wall (31) and only negligibly influenced by the filling level of the medium (35) in the container (30), said capacitance constituting a capacitive feedback of the amplifier (1),

whereby the first electrode (11) and the third electrode (13) can coincide and, in this case, form a first combined electrode (11a),

and also comprising a capacitor (24a) that has a third capacitance (24), whose magnitude is essentially influenced neither by the capacitive properties of the container (30) nor by the filling level of the medium (35) in the container (30), whereby one electrode (14) of the capacitor (24a) is connected to the output (4) while the other electrode (15) of the capacitor (24a) is connected to the input (3) of the amplifier (1), so that the capacitor (24a), parallel to the second capacitance (22), likewise constitutes a capacitive feedback of the amplifier (1),

whereby the capacitance (24) of the capacitor (24a) is selected in such a way that the amplifier (1), owing to the capacitive feedback, only oscillates when the filling level of the medium (35) in the container (30) and thus the first capacitance (21) each lie below a certain threshold, whereby the second capacitance (22) counters the capacitive influence of the container (30) that loads the input (3) of the amplifier

(1), so that the capacitive influence exerted by the container (30) is reduced.

2. The sensor according to claim 1, characterized in that the first combined electrode (11a), the third electrode (13) and the electrode (15) of the capacitor (24a) on the input side of the amplifier all coincide and thus form a second combined electrode (11b).

3. The sensor according to claim 1, characterized in that the second electrode (12) and the electrode (14) of the capacitor (24a) on the input side of the amplifier coincide and thus form a third combined electrode (12b).

4. The sensor according to claims 2 and 3, characterized in that the second combined electrode (11b) and the third combined electrode (12b) are mechanically rigidly connected to each other and optionally arranged concentrically.

5. The sensor according to claims 2 and 3, characterized in that the third combined electrode (12b) has a first plate (60) and a cutout second plate (62), which is connected to the first plate (60) by means of a conductor (61) and which is arranged at a distance from the first plate (60) and concentrically to it, whereby the second combined electrode (11b) lies in a plane with the cutout second plate (62) and is arranged inside said cutout.

6. The sensor according to claim 5, characterized in that the first plate (60) is attached to one side of a printed circuit board and the cutout second plate (62) and the second combined electrode (11b) are attached to the other side of the printed circuit board.

7. The sensor according to claim 1, characterized in that the sensor is part of a circuit that supplies a switching signal when the amplifier (1) is not oscillating.

8. The sensor according to claim 1, characterized in that the dimensioning of the amplifier (1) causes it to have a high operating frequency, whereby, due to the high operating frequency range, the capacitive reactive resistance of the coupling of the electrodes (11, 12, 13) to the medium (35) is reduced to such an extent that thin adhering layers or foams of the medium (35) with their low conductivity can be clearly distinguished from the compact medium with its higher conductivity, whereby if the filling level of the medium is below a certain threshold, while adhering medium or foam is present above the surface of the medium or above the filling level of the medium, the load of the input (3) of the amplifier (1) is influenced by the ohmic and capacitive resistance between the electrode (11) and the ground (50) in such a way that the amplifier (1) oscillates.

9. The sensor according to any of the preceding claims, characterized in that one electrode of the sensor consists of a plurality of electrodes connected to each other.

10. The sensor according to any of the preceding claims, characterized in that at least one electrode is arranged inside the container (30) and it is immersed into the medium (35) when a certain filling level is exceeded.

11. The sensor according to any of the preceding claims 1 to 13 *[sic]*, characterized in that the sensor is arranged inside the container (30) and it is immersed into the medium (35) when a certain filling level is exceeded.

12. A capacitive sensor for detecting the filling level of a medium (35) in a container (30) with a non-metallic wall (31), said sensor being connected to the earth or ground (50), comprising an amplifier (1) with an input (3) and an output (4) and having an amplification factor that is greater than 1, said amplifier (1) being provided with a feedback, and said sensor also comprising a circuit that supplies a switching signal when the amplifier (1) is not oscillating, also comprising a first electrode (11) that is connected to the input (3) of the amplifier (1) and that is loaded with a first capacitance (21) vis-à-vis the ground (50), so that the input (3) of the amplifier (1) is capacitively loaded, which brings about a decrease of a signal (2) that is present at the input (3) of the amplifier (1), whereby the electrode (11) is arranged in such a way that the electric field (41) generated by the signal (2) between the electrode (11) and the ground (50) travels essentially through the container (30) and through the medium (35) so that the magnitude of the first capacitance increases as the filling level of the medium (35) in the container (30) rises, also comprising a second electrode (12) that is connected to the output (4) of the amplifier (1) and comprising a third

electrode (13) that is connected to the input (3) of the amplifier (1), whereby the electrodes (12) and (13) are at a distance from each other and are positioned in such a way that a second capacitance (22) exists between them whose magnitude is largely influenced by the capacitive properties of the container (30) and only negligibly influenced by the filling level of the medium (35) in the container (30), said capacitance bringing about a capacitive feedback of the amplifier (1), which brings about an increase of a signal (2) present at the input (3) of the amplifier (1), and also comprising a capacitor (24a) that has a third capacitance (24), whose magnitude is essentially influenced neither by the capacitive properties of the container (30) nor by the filling level of the medium (35) in the container (30), whereby one electrode (14) of the capacitor (24a) is connected to the output (4) while the other electrode (15) of the capacitor (24a) is connected to the input (3) of the amplifier (1), so that the capacitor (24a), parallel to the second capacitance (22), likewise brings about a capacitive feedback of the amplifier (1), which brings about a further increase of the signal (2) that is present at the input (3) of the amplifier (1), whereby the capacitance (24) of the capacitor (24a) is selected in such a way that the amplifier (1), owing to the capacitive feedback, only oscillates when the filling level of the medium (35) in the container (30) and thus the first capacitance (21) each lie below a certain threshold, whereby the amplifier employed is an amplifier (1) having an operating frequency between about 4 MHz and about 10 MHz, as a result of which the load of the input (3) of the amplifier (1) is influenced by the ohmic and capacitive resistance between the electrode (11) and the ground (50) in such a manner that the amplifier (1) oscillates when the filling level of the medium (35) in

the container (30) is below this threshold and the inside of the wall (31) of the container (30) above the surface (36) of the medium (35) is wetted with a layer (37) of the medium (35) or when foam is present above the surface (36) of the medium (35), whereby the second capacitance (22) is selected in such a way that the decrease of the signal (2) due to the capacitive load of the input (3) of the amplifier (1) is countered only by the capacitive properties of the container (30) as a result of the increase of the signal (2) that is caused by the capacitive feedback only by the second capacitance (22), whereby the first electrode (11) and the electrode (15) of the capacitor (24a) on the input side of the amplifier form a disk-shaped second combined electrode (11b) that is configured as a strip-like conductor (62a) on a first side of a printed circuit board, and whereby the second electrode (12) and the electrode (14) of the capacitor (24a) coincide and form a third combined electrode (12b) that is mechanically rigidly connected to the second combined electrode (11b) and that has a disk-shaped first plate (60) that is configured as a track conductor on the other side of the printed circuit board, as well as a ring-shaped cutout second plate (62) that lies in a plane with the second combined electrode (11b) and surrounds it concentrically and that is configured as a conductor track on the first side of the printed circuit board and that is arranged concentrically to the first plate (60).

13. The sensor according to claim 12, characterized in that the second combined electrode (11b) is disk-shaped and the third combined electrode (12b) has a disk-shaped back plate (60) and a cutout front plate (62), which are electrically conductively and mechanically rigidly

connected to each other by means of an electrically conductive hollow-cylindrical spacer (61) located on their outer edges, whereby the second combined electrode (11b) is arranged concentrically in the cutout of the cutout front plate (62) and lies in a plane with the latter, whereby the fixed feedback capacitance (24) is essentially formed by the second combined electrode (11b) and by the back plate (60), whereas the compensation capacitance is essentially formed by the second combined electrode (11b) and the cutout front plate (62).